IN THE CLAIMS

Upon entry of the present amendment, the status of the claims will be as is shown below. This listing of claims replaces all previous versions and listings of claims in the present application.

LISTING OF THE CLAIMS

1. (Currently Amended) A solid-state imaging device comprising a plurality of unit pixels which are two-dimensionally arranged, wherein each of said unit pixels includes:

a photoelectric conversion part which converts incident light into electric charges;

a vertical ~~convex~~ lens layer which is formed above said photoelectric conversion part, and which is generated by forming a film through which the incident light is transmitted; and

~~a concavo-convex lens layer which is formed on and around said lens layer, and which collects the incident light and outputs the incident light to said lens layer~~ a lens layer that includes a plurality of light-transmission films each including concentric circles, that is formed on and around said vertical lens layer, and that collects the incident light and outputs the incident light to said vertical lens layer through said light-transmission films,

wherein ~~said lens layer includes a light-transmission film having a shape of concentric circles in which~~ in each of said plurality of light-transmission films, a ratio of a total line-width to a periodic width varies ~~depending~~ based on a plurality of zones, each of which is obtained by dividing said light-transmission film by a predetermined periodic width in an in-plane direction.

2. (Canceled)

3. (Currently Amended) The solid-state imaging device according to claim 1,

wherein a refractive index of said vertical lens layer is greater than a refractive index of said lens layer that includes said plurality of light-transmission films.

4. (Currently Amended) The solid-state imaging device according to claim 1, further comprising:

a wavelength separation part which is formed above said photoelectric conversion part and through which light of a predetermined wavelength range is transmitted,

wherein a thickness and a width of said lens layer that includes said plurality of light-transmission films are set to achieve a predetermined focal length for the light of the predetermined wavelength range.

5. (Currently Amended) The solid-state imaging device according to claim 1,

wherein said lens layer that includes said plurality of light-transmission films is made of one of boron phosphorous silicon glass, tetra ethoxy silane, benzocyclobutene, and polyimide resin.

6. (Currently Amended) The solid-state imaging device according to claim 1,

wherein said lens layers that includes said plurality of light-transmission films are thicker at ~~have a part where said lens layers are getting thinner from~~ a center of said pixel than at ~~towards~~ a periphery of said pixel.

7. (Currently Amended) The solid-state imaging device according to claim 1,

wherein said lens layer that includes said plurality of light-transmission films has a concentric shape for which a ~~whose~~ center is not directly ~~immediately~~ above a center of said photoelectric conversion part.

8. (Currently Amended) A method for manufacturing a solid-state imaging device comprising a plurality of unit pixels which are two-dimensionally arranged, wherein each of the unit pixels includes:

a photoelectric conversion part which converts incident light into electric charges

a vertical ~~convex~~ lens layer which is formed above the photoelectric conversion part, and which is generated by forming a film through which the incident light is transmitted; and

~~a concavo-convex lens layer which is formed on and around the lens layer, and which collects the incident light and outputs the incident light to the lens layer~~ a lens layer that includes a plurality of light-transmission films each including concentric circles, that is formed on and around said vertical lens layer, and that collects the incident light and outputs the incident light to said vertical lens layer through said light-transmission films,

said method comprising:

forming a material layer on a base in order to form the vertical lens layer;

forming a resist film on the material layer;

forming a pattern on the material layer in which a distance between the resist films is increased from a center of the pixel towards a periphery of the pixel; and

etching the material layer up to a point where the material layer outside of said pattern still remains.

9. (Currently Amended) A camera comprising a solid-state imaging device that includes a plurality of unit pixels which are two-dimensionally arranged, wherein each of said unit pixels includes:

a photoelectric conversion part which converts incident light into electric charges;

a vertical ~~convex~~ lens layer which is formed above said photoelectric conversion part, and which is generated by forming a film through which the incident light is transmitted; and

~~a concavo-convex lens layer which is formed on and around said lens layer, and which collects the incident light and outputs the incident light to said lens layer~~ a lens layer that includes a plurality of light-transmission films each including concentric circles, that is formed on and around said vertical lens layer, and that collects the incident light and outputs the incident light to said vertical lens layer through said light-transmission films,

wherein ~~said lens layer includes a light-transmission film having a shape of concentric circles in which~~ in each of said plurality of light-transmission films, a ratio of a total line-width to a periodic width varies ~~depending~~ based on a plurality of zones, each of which is obtained by dividing said light-transmission film by a predetermined periodic width in an in-plane direction.

10. (New) The solid-state imaging device according claim 1,

wherein said lens layer that includes a plurality of light-transmission films has a refractive index periodic structure of concentric circles which includes a high-refractive material layer and a low-refractive material layer.

11. (New) The solid-state imaging device according to claim 10,

wherein a ratio of the high-refractive material layer to the low-refractive material layer in the refractive index periodic structure is greater at a center of said unit pixel than at a periphery of said unit pixel.

12. (New) The solid-state imaging device according to claim 1,

wherein a shape of said vertical lens layer is one of a rectangular solid and a cylinder.

13. (New) A solid-state imaging device comprising a plurality of unit pixels which are two-dimensionally arranged,

wherein each of said unit pixels includes:

a photoelectric conversion part which converts incident light into electric charges;

a first high-refractive material layer which is formed in a predetermined area above said photoelectric conversion part, and through which the incident light is transmitted; and

a lens layer that includes a plurality of light-transmission films through which the incident light is transmitted, that is formed on at least said first high-refractive material layer, and that collects the incident light and outputs the incident light to said first high-refractive material layer,

wherein said lens layer that includes said plurality of light transmission films has a refractive index period structure of concentric circles which includes a second high-refractive material layer and a low-refractive material layer; and

wherein a ratio of the second high-refractive material layer to the low-refractive material layer in said lens layer that includes said plurality of light-transmission films is greater at a center of said unit pixel than at a periphery of said unit pixel.

14. (New) The solid-state imaging device according to claim 13,

wherein a refractive index of the first high-refractive material layer is greater than a refractive index of the second high-refractive material layer.

15. (New) The solid-state imaging device according to claim 14,

wherein the first high-refractive material layer is made of SiO_2, and

wherein the second high-refractive material layer is made of one of benzocyclobutene and polyimide resin.